RESTORATION ADVISORY BOARD MEETING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), BETHPAGE
TOWN OF OYSTER BAY, BETHPAGE COMMUNITY CENTER
103 GRUMMAN ROAD WEST, BETHPAGE, NEW YORK
TUESDAY, AUGUST 11, 2015

The thirty-sixth (36th) meeting of the Restoration Advisory Board (RAB) was held at the Bethpage Community Center in Bethpage, New York. Meeting attendees included representatives from the Navy (Lora Fly, Tom Kreidel, and Melissa Forrest), the Management Edge (Gayle Waldron), New York State Department of Environmental Conservation (NYSDEC) (Steven Scharf, Jim Harrington, Henry Wilkie, John Swartwout, and Walter Parish), New York State Department of Health (NYSDOH) (Steve Karpinski), United States Environmental Protection Agency (USEPA) (Peter Mannino), Nassau County Department of Health (NCDOH) (Joseph DeFranco) Town of Oyster Bay (John Ellsworth), Town of Hempstead (John Reinhardt) H&S Environmental (Greg Pearman and Jennifer Good), Bethpage Water District (BWD)(Michael Boufis and John Sullivan), Massapequa Water District (MWD) (Stan Carey and Joseph Tricarco), H2M (Rich Humann-BWD, and Paul Grainger-MWD), Tetra Tech (David Brayack), and Resolution Consultants (Farrell Bell, Brian Caldwell, Brock Harris, Gordon Hicks, Shreyas Mantri, Valerie Thayer, Vincent Varrichio, Eleanor Vivaudou, and Michael Zobel). RAB members in attendance were Sandra D'Arcangelo, Tim Cook, and David Sobolow. There were 20 residents from Bethpage and neighboring towns in attendance. The meeting sign-in sheet is provided as Appendix A.

OPEN HOUSE SESSION AND ASSEMBLYMAN

Prior to the start of presentations, an open house session was held. There were two groups of informational poster displays and an area for residents to speak with regulators. The public was invited to peruse the information provided and ask questions to the Navy representatives and regulators.

After the open house, Assemblyman Joseph Salandino requested time to speak to the public. Mr. Salendino informed the attendees of the following:

- Last year, Governor Cuomo signed a law that required the NYSDEC to report on the best method for remediation; he stated that he has been working with the NYSDEC to push along a plan of full hydraulic containment of the plume;

- Mr. Salindino's stated that the intent of the law is to clean up the plume without water district wellhead treatment. He has proposed installation of a series of extraction wells along

Southern State Parkway; the water would then be pumped along Southern State Parkway to Route 135 and up to a cleaning facility at the Grumman property. It would then be used to irrigate the Bethpage State Golf Course or reinjected into the aquifer. He estimates that if this is implemented for 35 years, it is possible to clean up the plume;

- He also expressed his concern about New York City requesting to reactivate wells in the Magothy, which could affect water availability on Long Island.

WELCOME AND AGENDA REVIEW

The Navy representative, Ms. Lora Fly, welcomed everyone to the RAB meeting and presented the meeting agenda. Ms. Fly also introduced Gayle Waldron (The Management Edge, serving the role of facilitator in support of the RAB), who then went over the Rules of Conduct to ensure that everyone is allowed the opportunity to comment. The Rules of Conduct are provided in Appendix A. Ms. Fly informed the attendees about navigation of the public website for NWIRP Bethpage (http://go.usa.gov/DyXF). Ms. Waldron introduced David Sobolow the RAB co-chair. Mr. Sobolow introduced the two RAB members present and explained that they are to be the interface between the community, the Navy and the regulators. Ms. Waldron then invited the water districts and the regulators who were present to introduce themselves. A quorum of RAB members was not present; therefore, the last meeting minutes were not finalized.

ENVIRONMENTAL RESTORATION PROGRAM REVIEW

Ms. Fly provided an overview presentation of NWIRP Bethpage which included: facility background, the environmental clean-up program, points of contact, investigation and response, Site 1-Former Drum Marshalling Area, Site 4-Former UST site, and the Operable Unit (OU) 2 Groundwater Investigation and treatment. Ms. Fly also outlined the path forward for each of the sites. The presentation is included in Appendix C.

REMEDIAL INVESTIGATION ADDENDUM SITE 1-FORMER DRUM MARSHALLING AREA

Mr. David Brayack of Tetra Tech provided a presentation identifying the history, remedial investigation addendum results, and path forward for Site 1 - the Former Drum Marshalling Area. The presentation is included in Appendix C.

Mr. Brayack provided a brief description of the areas of concern at Site 1 including the two former drum marshalling pads, abandoned cesspools, drywells, above ground storage tanks, sludge drying

bed and storage sheds. The primary chemicals of concern are polychlorinated biphenyls (PCBs) chlordane and polynuclear aromatic hydrocarbons in soil, PCBs, arsenic and hexavalent chromium in groundwater and tetrachloroethylene and trichloroethylene in soil vapor. He reviewed a brief history of remedial activities, beginning with the initial investigation in 1991, the Record of Decision in 1995, and supplemental investigation and remedial actions including installation of the soil vapor extraction system, and the ongoing soil vapor containment system. The shallow groundwater and volatile organic compounds in the soil have been addressed by a soil vapor extraction/sparging system that operated from 1997 to 2002 and the soil vapor containment system that is currently operating. Mr. Brayack went over the results of the current supplemental investigation and the path forward. A feasibility study is planned to be completed in the next year. Based on this study, the Navy, in conjunction with the NYSDEC and NYSDOH, will develop a proposed plan for final remediation; a final ROD amendment incorporating the proposed plan remedy is anticipated to be issued in 2016.

OU 2 OFFSITE GROUNDWATER INVESTIGATION- INSTALLLATION of VERTICAL PROFILE BORINGS (VPBs)

Mr. Brian Caldwell of Resolution Consultants provided a presentation identifying offsite program objectives. Mr. Caldwell reviewed the local groundwater geology and applicability to the plume and presented the VPBs and wells that have been installed and sampled since 2009. He also described work performed since the last restoration advisory board meeting, future work to be implemented, and recent reports with their respective results. The presentation is included in Appendix C.

As described in the presentation, the objectives of the offsite groundwater investigation are threefold. The first objective is to protect the public water supply wells by installing outpost wells. The second is to delineate the RE108 hot spot, and the third is to address the hotspot by evaluating the remedial options. The investigation program consists of installing vertical profile borings, permanent monitoring wells, and data loggers to ensure successful monitoring of outpost wells, support the United States Geological Survey groundwater modeling, and to determine capture zone analysis for wells as needed for groundwater cleanup.

The process of determining VPB and well locations was then described. Locations are determined based on the spots designated critical for tracking the plume, to minimize inconvenience to nearby residents, and to meet the space requirements of drilling rig operations. All efforts are being made to use locations that minimize disruption to the residents.

For discussion purposes to describe investigative work, the areas of investigation have been divided into three geographic zones and are referred to as north of Hempstead Turnpike, north of Southern State Parkway, and south of Southern State Parkway. Work performed since November 2014 includes: mobilization of three drilling rigs, installation of six Vertical Profile Borings (three north of Hempstead Turnpike and three located north of Southern State Parkway), and installation of 17 monitoring wells (five north of Hempstead Turnpike; eight north of Southern State Parkway and four south of Southern State Parkway) and three rounds of quarterly groundwater sampling. The results of the recently installed VPBs and the quarterly groundwater sampling results were also presented. Future work includes: continued mobilization of three drilling rigs, installation of additional VPBs (two north of Hempstead Turnpike, and seven north of Southern State Parkway), and installation of 41 wells associated with both the completed and planned VPBs in the three geographic areas.

Discussion questions were as follows:

1. **On Slide 15, why is the isolated circle at the southern end of the map not connected to the large 5 parts per billion (ppb) plume?** The distance between the circle and the 5 ppb contour is large. The Navy is planning on installing additional vertical profile borings between the two in order to ascertain if the two should be connected.
2. **The concentrations appear to be going up. If the area is being cleaned up shouldn't the concentrations be decreasing?** At this time, two wells within the RE108 hot spot are increasing. The Navy will continue to assess the groundwater results to evaluate if the concentrations are increasing or decreasing and in which area they are occurring.
3. **Do the VPBs penetrate the Raritan Clay Layer? If so, isn't that risky?** The VPBs are advanced to the top of the Raritan Clay, and do not fully penetrate through it.
4. **Is the Navy considering installing an additional outpost well?** Yes, the Navy is evaluating possible drill sites for another outpost well near MWD.
5. **What risk is there with drilling of the VPB in regard to releasing contaminants or vapors into the air?** Air samples are collected and the air is monitored continually during the drilling; the results have shown that air within the drilling areas is the same as background.
6. **If NG says the ONCT is working, why are you doing the investigation?** Ms. Fly stated that the presence of the RE108 hotspot requires that the Navy evaluate the possibility that contamination may have bypassed the ONCT, or if it is coming from another source not associated with Navy/NG operations. This is why the second overall goal of the program is to evaluate the RE108 hotspot.

7. **Is the DOH monitoring or tracking diagnosis of cancers or diseases associated with exposure to PCBs and Volatile Organic Compounds (VOC)?** Mr. Karpinski stated the NYSDOH and the NCDOH monitors treated water results from the water districts; and the water results meet all of the drinking water standards.
8. **What concerns should residents have for their health and safety?** Contamination is noted in deep groundwater, and the water districts have the treatment systems in place to protect the drinking water, therefore there is no exposure to residents and no health and safety concerns.
9. **Were people exposed before?** Mr. Karpinski stated the NYSDOH is evaluating the potential exposures in the past. A report documenting this study is anticipated to be completed soon, and can be obtained by contacting Mr. Karpinski.
10. **How can you say the public is not being exposed when there is a new hotspot? The concentrations are too large to ignore. How do you know what is happening 100's of feet below the ground? Were we exposed before 1978? Is any department taking any data from people in Bethpage community on health issues? Is anyone interested in that data?** Mr. Karpinski stated that there is no current exposure to contamination in groundwater because the water is treated before being distributed to the public. Again, the NYSDOH is evaluating the potential for past exposure, and the report will be available soon.
11. **Where are the home owners that should be aware of these meetings?** The Navy provides notices of the meetings via email and mailed notices to the contact list, and provides notices in the newspaper at least two weeks before the meetings. The contact list is made from the sign-in sheets of all of the meetings. Mr. Sobolow stated that on behalf of the RAB he placed notices in the grocery stores for the November meeting. The dates of the meetings can also be checked on the Navy website, which is located at the bottom of the agenda for this meeting.

CLOSING REMARKS

Ms. Fly asked whether there were any other questions or comments. There were no other questions or comments. Ms. Fly indicated that the next RAB meeting would be held in November 2015. Ms. Fly thanked everyone for coming to the meeting and the meeting was adjourned.

Other questions from the public concerning Operable Unit 3 that are being addressed by NG:

1. **What actions are the NYSDEC taking on the hotspot (12,000 ppb; identified by Northrop Grumman [NG] well to the northwest of the RE108 hotspot) to prevent impacts to downstream public water supply wells?** This is in the area of OU3 being investigated by NG. Mr. Harrington stated that NYSDEC is working with NG to

evaluate potential down-gradient impacts, and the investigation is on schedule.

2. **Has the Bethpage Community Pool and its surrounding park been cleaned up in its entirety? Is there any reason for concern?** Mr. Harrington stated that Bethpage Community Park area interim remedial measure was completed by the Town of Oyster Bay (TOB). The interim measure remediated almost all of area. The Ballpark is being addressed under OU3 with NG.
3. **Can the Bethpage Community Park be used as before?** Mr. Harrington explained that remediation was completed by the TOB 20 years ago; remaining contamination is being addressed under OU3. There is a possibility when that is finished that ballfields could be built once that is completed.
4. **What is being done about reimbursement for those who have become ill due to NG negligence?** Mr. Sobolow stated that it is legal issue and is beyond the scope of this meeting.
5. **Was the off-site groundwater contamination from Bethpage discovered prior to the Community Park contamination? How will this affect the people of the Bethpage community health-wise, and not just the water and air quality?** The off-site contamination was discovered as an expansion of the investigation at Bethpage Community Park. NG and the Navy are investigating the extent of contamination.

APPENDIX A

11 AUGUST 2015 RAB MEETING SIGN-IN SHEET AND RULES OF CONDUCT

36th RAB Meeting for NWIRP Bethpage
August 11, 2015
Sign-in List

Name (Print)	Phone number and/or email if interested in being on mailing list	Affiliation	How did you hear about the meeting?
Mike Boufis			
JOHN SULLIVAN			
Assemblyman Joseph Saladino			
Carol Colman			
Eleanor Vivrow			
Mike Zobel			
Sal J. Greco			
MARTIN HACKER			
WALTER PARISH			
John Swartwout			
Jim Harrington			
Joanne DePrez			

36th RAB Meeting for NWIRP Bethpage
August 11, 2015
Sign-in List

Name (Print)	Phone number and/or email if interested in being on mailing list	Affiliation	How did you hear about the meeting?
Ahren Tatro			
Steve Karpinski			
KAREN GIUNTA			
Michael Hauptmann			
Bill Seevers			
Farrell Bow			
Ann Flannery			
M. O'Brien			
Joanne Perrico			
John Reinhardt			
V. Buono			
Tom Hand			
JOE TRIGARICO			
Laura Lorusso			
Vincent Lorusso			
Jon Good			

36th RAB Meeting for NWIRP Bethpage
August 11, 2015
Sign-in List

Name (Print)	Phone number and/or email if interested in being on mailing list	Affiliation	How did you hear about the meeting?
Gordon Hicks			
EDWARD OLMSTED			
Darlene Cannava			
Steven Schaf			
Sophia Hephastou			
KATHLEEN BRACKEN			
SANDRA D'ARCANGELO			
DANIEL MULÉ VALERIE MULÉ			
[illegible]			
Doug Alone			
Diane Silva			
TIM COOK			
Bill Merklin			
PAUL GRAINGER			
DAVID SOBOLOW			
Stan Carey			

GROUND RULES
AUGUST 2015 RESTORATION ADVISORY BOARD (RAB)

NAVAL WEAPONS INDUSTRIAL
RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

08/11/2015

Naval Weapons Industrial Reserve Plant Bethpage RAB Ground Rules

- **Respect others:**
  - –One Speaker at a time
  - –No interruptions
  - –No side conversations
  - –Listen and stay open to all points of view
- **Ask questions or make statements after all the presentations are given: (approximately 8:30)**
  - –During the presentations, write any questions on the cards on your table and pass them forward, or raise them and they will be picked up and taken to the RAB Community Co-Chair.
  - –They will be answered after presentations are completed.
- **Stay focused on the topics; avoid digressions.**
- **Turn cell phones and /or pagers off, or on vibrate, and respond outside or during breaks, except for emergencies.**

The Management | Edge

APPENDIX B

RAB MEETING AGENDA AND DEFINITIONS

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Agenda for Restoration Advisory Board

Naval Weapons Industrial Reserve Plant Bethpage

Date: August 11, 2015
Time: 6:00 PM
Location: Bethpage Community Center-103 Grumman Road West, Bethpage NY

Time: 6:00 PM to 7:30 PM

An Open House Meeting will be held that will consist of multiple information displays to allow the public to learn more about the Navy's Environmental Restoration Program at NWIRP Bethpage and discuss questions and concerns with representatives from the Navy, regulatory agencies, and community members serving on the RAB.

Time 7:30 PM to 8:30 PM

- Ground Rules – *Management Edge*
- Introduction of RAB members and Regulators - *Management Edge*
- Distribution of minutes – *Navy*
- Overview of Site History – *Navy*
- Site 1 History Remedial Investigation Addendum and path forward – *Tetra Tech*
- OU-2 Offsite Groundwater Investigation Installation of VPB and Wells– *Resolution*

Time 8:30 PM to 9:00PM

- Questions – *Public*
- Closing remarks – *Navy*

Copies of information can be found at the document repository located at the Bethpage Public Library, 47 Powell Avenue, Bethpage NY 11714 (516-931-9307) or online at http://go.usa.gov/DyXF.

RESOLUTION CONSULTANTS

RAB Members

David Sobolow – Community Co-Chair

Charles Bevilacqua

Tim Cook

Sandra D'Arcangelo

Robert Horan

Ethan Irwin

Jeanne O'Conner

Eugenia Mazzara

Rosemary Styne

Roy Tringali

Rose Walker

Regulators

NYSDEC	NYSDOH	NCDOH
Jim Harrington	Steve Karpinski	Joseph DeFranco
Steve Scharf		
Henry Wilkie		

Definitions and Clarification of Terms, Acronyms and Abbreviations

For the Bethpage Restoration Advisory Board (RAB)

- **Basic:**
  - VOC--Volatile Organic Compounds:
    - Chlorinated solvents (typically used as degreasers in manufacturing)
  - Effluent
    - Is an outflow of water from a treatment source
  - Free Product
    - Substance (usually oil or gasoline) that exists in its own state-it is not dissolved in water.
  - Soil Vapors
    - Gases contained in the pore spaces of soil
  - Capture Zone
    - Area of water whose flow direction is influenced by pumping
  - Ground Water
    - Water flows through open pore spaces of soil
  - Down gradient
    - The direction of groundwater flow
  - Plume
    - An area that impacts from chemicals are detected in
  - Raritan Clay Layer
    - A geologic horizon - Clay that is approximately 800-100 feet below ground surface – accepted to be the bottom of the Magothy aquifer
  - Aquifer
    - an underground layer of water-bearing permeable rock or unconsolidated materials
  - Trichloroethylene-
    - Volatile organic compound of concern (used as a degreaser in manufacturing)
  - OU- Operable Unit
  - BGS - Below Ground Surface
  - PCB- Polychlorinated Biphenols (used as transformer cooling fluid)
  - NG- Northrop Grumman
  - NWIRP-Naval Weapons Industrial Reserve Plant
  - No. 6 Fuel Oil- tar
  - Hot spot
    - Area where trichloroethylene is at a concentration greater than 1000 parts per billion
  - BWD Plants- Bethpage Water District Plants

- **Data Gathering:**
  - Gauging- measurement of ground water levels from top of ground surface
  - In-situ – in place
  - Delineate- define boundaries
  - VPB- Vertical Profile Boring
  - Monitoring Well- (typically 2-6 inches in diameter) a well used to provide a "snapshot" of water quality when sampled

- **Treatment Technologies:**
  - Biosparging
    - Removal of chemicals by breaking them down with bacteria
  - Steam Injection/Free Product Recovery
    - Heating of oil that has a tar like consistency with steam to make it flowable (syrup like consistency) so that it may be removed
  - Air Stripping
    - Removal of dissolved volatile organic compounds from water by transferring it into air
  - Land Use Controls
    - Action that restricts what land can be used for
  - Vapor Phase treatment-
    - Removal of a chemical from gas; used to remove trichloroethylene from air vapor
  - Biodegradation
    - Reduce a chemical by changing conditions so that bacteria can break down the chemical
  - On-site Containment Treatment System (ONCT)
    - Series of wells that remove and treat groundwater at the southern edge of the former Northrop Grumman property
  - SVECS—Soil Vapor Extraction Containment System
    - Vacuum for volatile chemicals trapped in the air between soil particles; used to remove trichloroethylene
  - Equalization Tank
    - Tank for mixing
  - Liquid Phase Granular Activated Carbon Polishing
    - Removal of remnants of a volatile chemical by passing liquid through carbon; used to remove trichloroethylene

- Recharge basin
  - Sandy basin that receives storm water and allows water to filter down into the ground
- Recovery Well
  - (Typically larger diameter 12 to 36 inches) a well used to recover oil or water containing chemicals

- **Regulatory:**
  - Proposed Plan- Plan of action that is sent to the state for approval prior to the Final Record of Decision
  - Feasibility Study- collection of data used to determine if a remedy will work
  - ROD –Record of Decision
  - Compliance sampling- collection of samples to demonstrate that chemicals are below regulatory levels
  - CERCLA- **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** – the legal mechanism for cleaning up inactive hazardous waste sites at DOD (Depart of Defense) facilities, this is the defining regulation for the Navy's Environmental Restoration (ER) Program at NWIRP Bethpage under NYSDEC authority.
  - RCRA- **Resource Conservation and Recovery Act (RCRA) Corrective Action** – a statutorily required cleanup program, similar to CERCLA, that addresses active solid waste management units and contaminated media as a condition of RCRA permits - NWIRP Bethpage has a RCRA Permit with NYSDEC
  - NYSDEC- **New York State Department of Environmental Conservation (NYSDEC)** provides regulatory review and approval of Navy actions at NWIRP Bethpage
  - NYSDOH- **New York State Department of Health (NYSDOH)** assists NYSDEC.
  - USEPA- **United States Environmental Protection Agency (USEPA)** Provides federal review of the Navy actions.

APPENDIX C

PRESENTATIONS

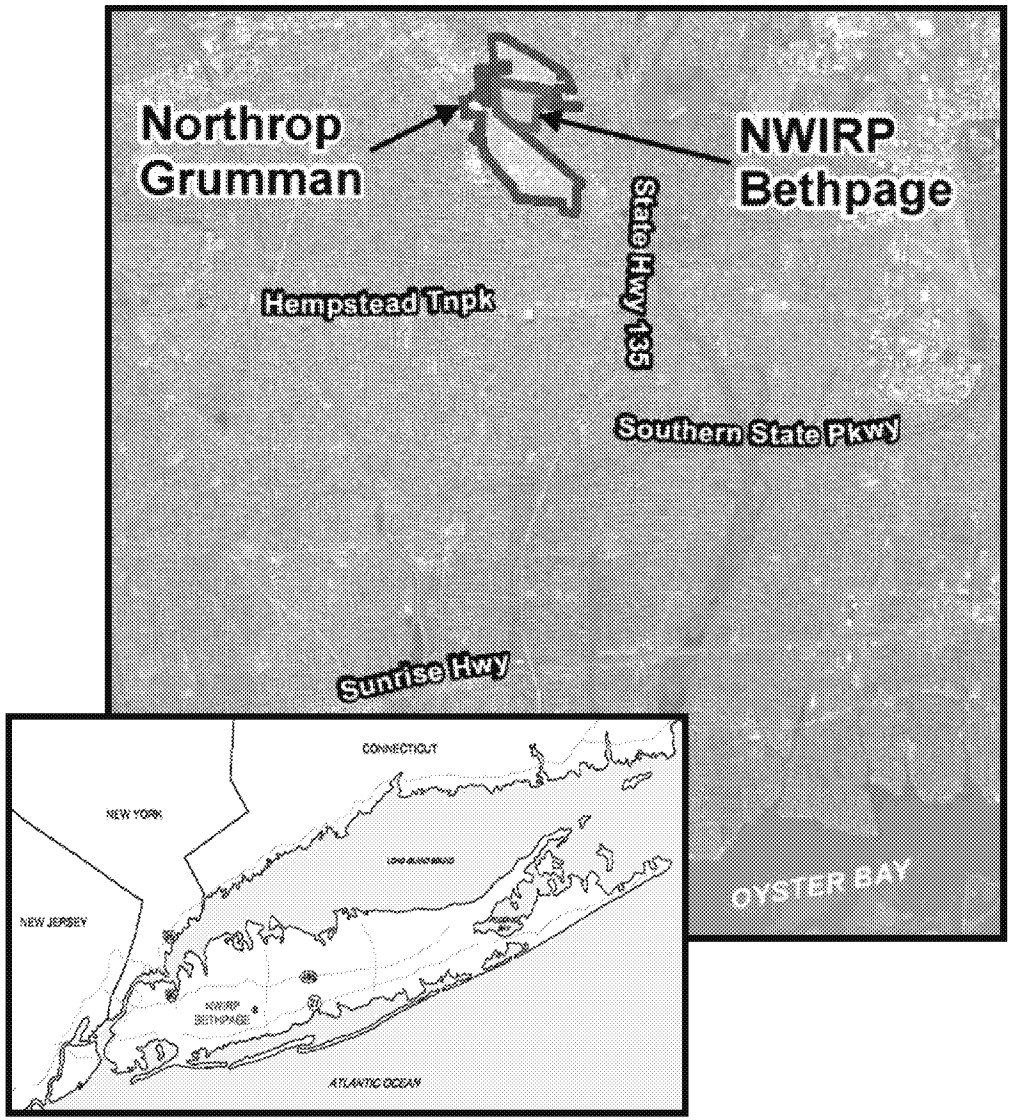
OVERVIEW
AUGUST 2015 RESTORATION ADVISORY BOARD (RAB)

NWIRP BETHPAGE
LONG ISLAND, NEW YORK

8/11/2015

Facility Background

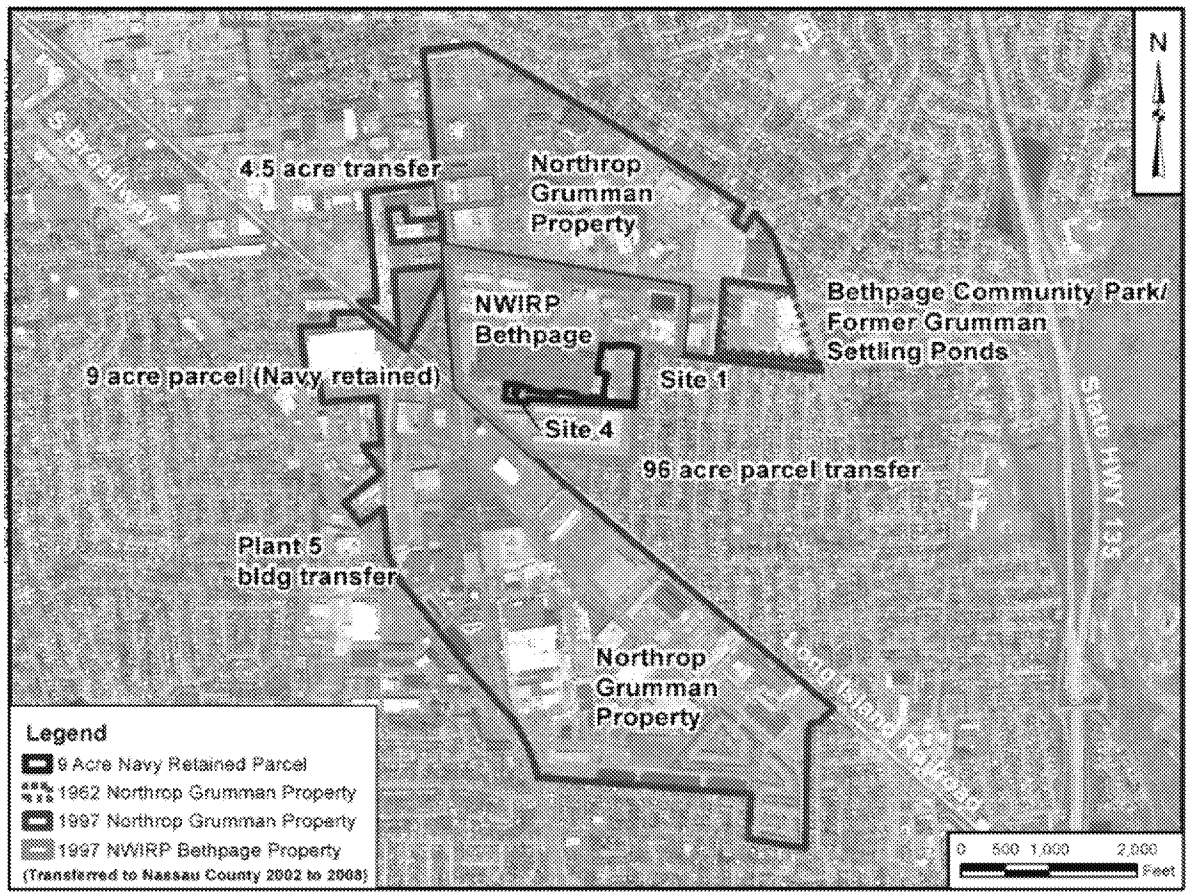
- **1940s - Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage**
  - –established to build Navy aircraft (originally 109 acres)
  - –government-owned contractor-operated (GOCO) facility
- **Northrop Grumman (NG)**
  - –operated the NWIRP as contractor;
  - –also owned and operated its own facility adjacent to NWIRP
  - –(500 +/-acres)
- **1996**
  - –NG terminated manufacturing activities on NWIRP



Facility Background

- Feb 2008 Transfer
  - 100 acres transferred to Nassau County
  - Included Environmental Restoration Sites 2 and 3 – cleanup complete

- **Current Navy property**
  - 9 acres retained by Navy for environmental cleanup (*ER Sites 1 and 4 and offsite groundwater OU2*)
  - 500-foot boundary with a residential neighborhood along the east
  - Remainder mostly bounded by Nassau County and Steel-Los III, LP properties (formerly Navy property).



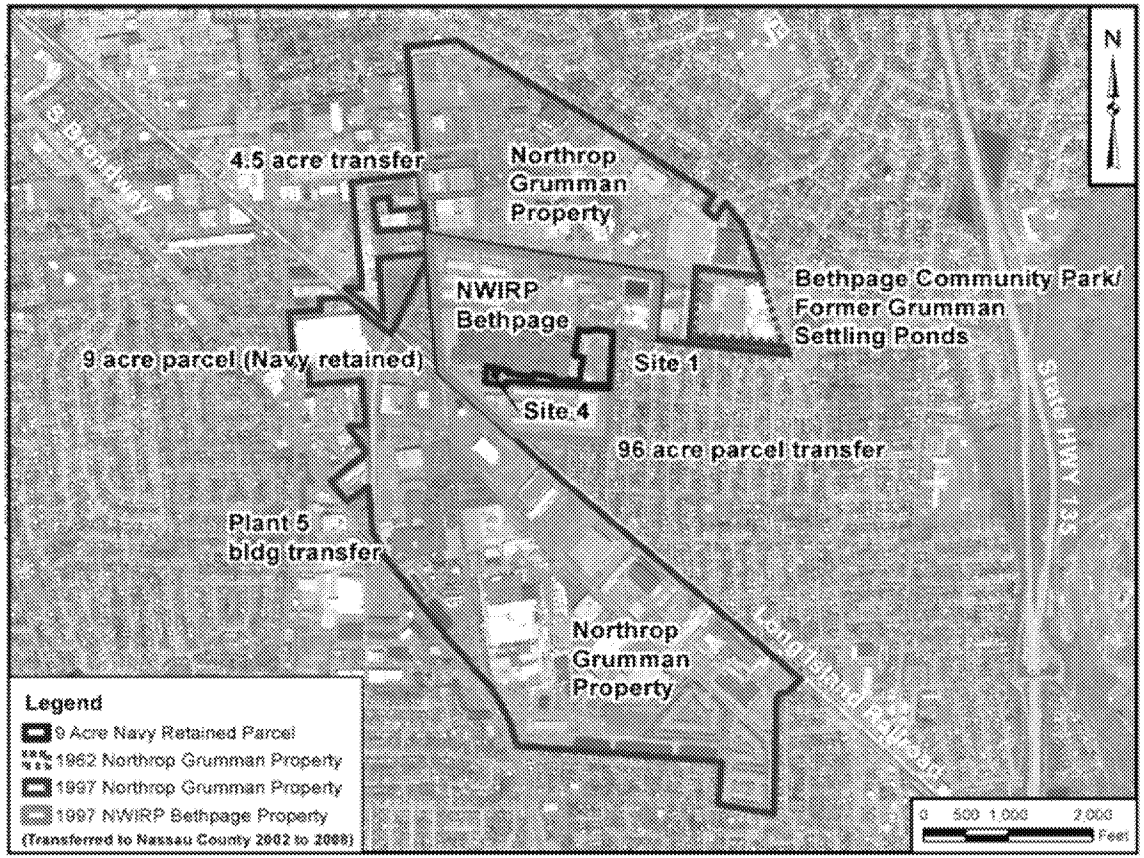
Environmental Cleanup Program

Environmental Restoration Program conducted to meet requirements of the
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

- **Navy**
  - ***is the Lead Federal Agency under EPA's CERCLA regulations***
- **Regulator Involvement**
  - ***New York State Department of Environmental Conservation (NYSDEC)*** provides regulatory review of Navy actions with assistance from the ***New York State Department of Health (NYSDOH).***
  - **United States Environmental Protection Agency (USEPA)** has had limited involvement since NWIRP Bethpage is not a federal National Priorities List (NPL) site.
  - **United States Geological Survey (USGS)** provides technical support on groundwater issues
- **Bethpage Restoration Advisory Board (RAB)**
  - Community members review official documents and attend routine meetings
  - Provide information on local concerns, issues and advise on cleanup goals and plans to the Navy
  - ***Discussions/interactions limited to Navy environmental restoration site work***

Northrop Grumman

- **Point of Contact**
  - Henry Wilkie, NYSDEC
  - Steve Scharf, NYSDEC



The Navy has no control over or involvement in environmental cleanup decisions for the Northrop Grumman Property

Site 1 – Former Drum Marshalling Area

- Used by Northrop Grumman for staging waste solvents, liquid plating wastes (metals), and autoclave (PCB fluid) wastes.

- Volatile Organic Compounds (VOCs) in soil and shallow groundwater – **cleanup complete**

- VOCs in soil vapor – **cleanup in progress**
  - Ongoing monitoring of soil vapor extraction system
  - Reports available

- Polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and metal in soil – **planning cleanup**
  - Estimate 60,000 cubic yards of PCB impacted soil
  - Contamination down to 65 feet deep
  - Jan 2015 – Draft Remedial Investigation Addendum
  - Fall 2015 – Draft Feasibility Study

Site 4 – Former UST Site

Former underground storage tanks for No. 6 Fuel Oil

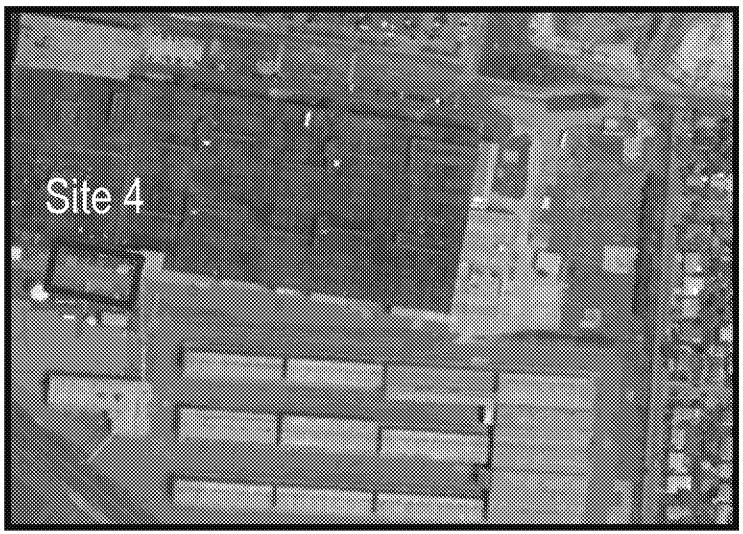
- –Tanks were likely removed in the 1980s.
- –Petroleum in soils 30 to 71 feet deep, near the water table
- –Impacted soil covers an area of approximately 0.14 acre
- –Minimal groundwater impacts

Proposed Plan

- –Free Product Recovery
- –Biodegradation Polishing
- –Groundwater Monitoring

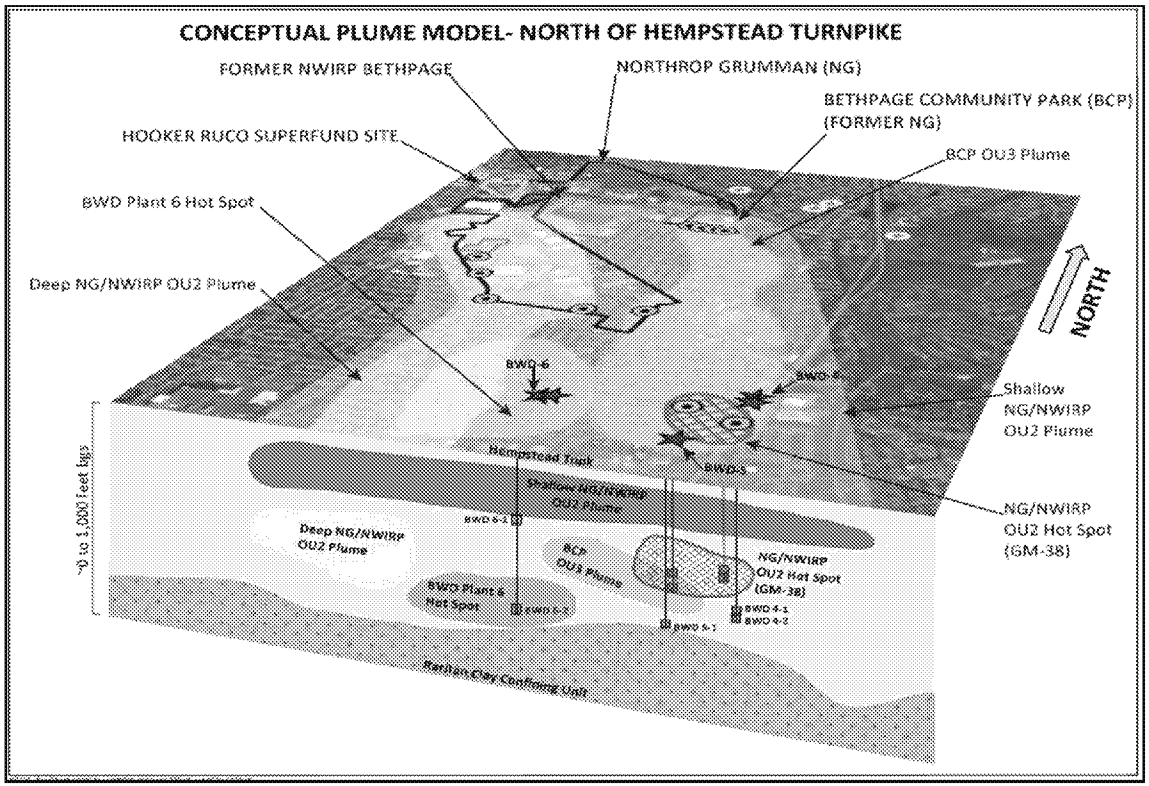
Timeline

- –Fall 2015 - Record of Decision
- –Spring 2016 – Start Cleanup
  - – Anticipated to operate for 2 to 4 years
  - – Groundwater Monitoring to continue for more than 10 years



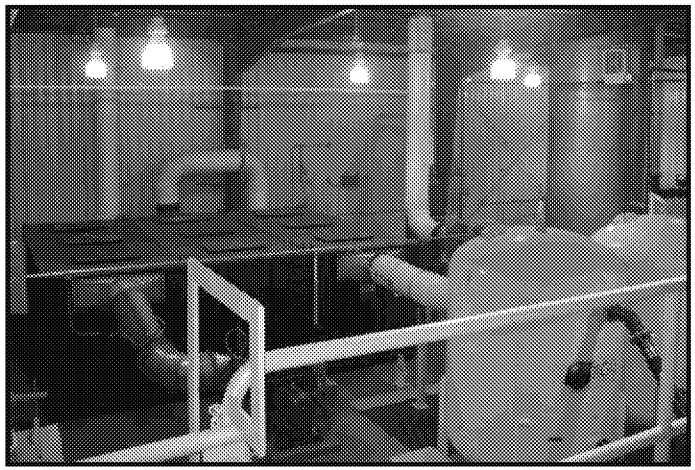
OU2 Groundwater Investigation

- **Commingled contamination**
  - –source area on both NWIRP property and Northrop Grumman property
  - –Other properties may be contributing
- **Covers over 3,000 acres**
- **Not uniformly distributed**
  - –Multiple widely dispersed plumes or “fingers”
  - –VOCs are present at different concentrations and different depths in different areas of OU2
  - –Most of the groundwater is free of VOCs



OU2 Off-Property Treatment

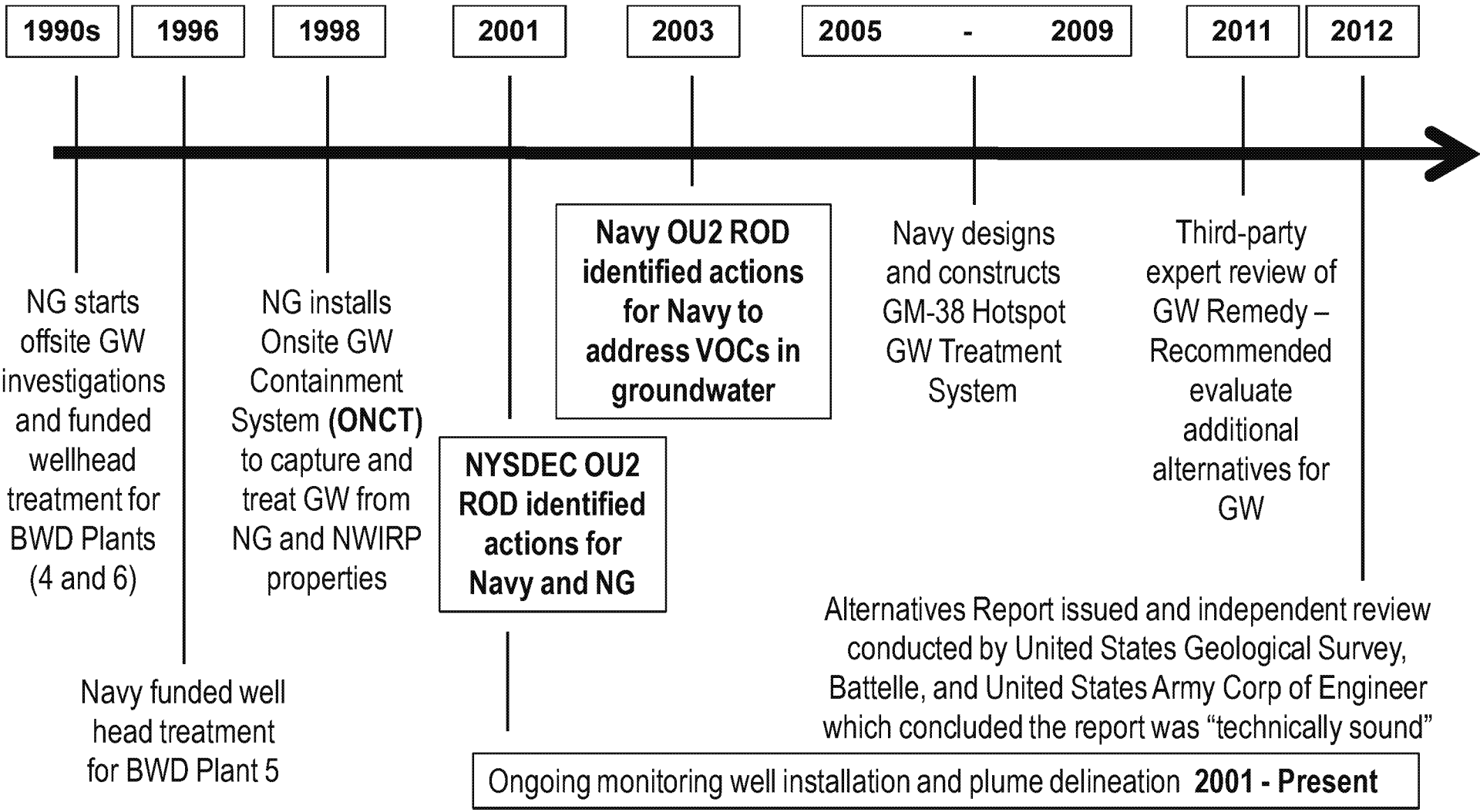
- GM38 Treatment System
  - –System started operation in 2009
  - –Treated approximately 2.43 billion gallons since December 2014
  - –Approximately 4 tons of VOCs removed from the aquifer since startup
  - –Groundwater concentrations have decreased by 80 to 95 percent
  - –USGS provided modeling support
- Wellhead Treatment Systems Funded by U.S.
  - –Bethpage Water District (BWD)
    - Plant 5 - 1996
    - Plant 6 - upgrades, 2011
  - –South Farmingdale Water District (SFWD)
    - Plant 1 - 2011
    - Plant 3 - 2013
  - –New York American Water (NYAW) Seamans Neck Rd,
    - Interim system, 2012
    - Full scale system, 2015



2003 OU2 Groundwater Record of Decision (ROD)

- Full containment of the off-site groundwater contamination is not feasible
- Restrictions on future use of NWIRP groundwater
- Groundwater Monitoring – Plume Delineation
  - –Identify and treat groundwater "hot spots"
  - –Predict potential impacts to public water supply
- Public Water Supply Protection

Groundwater Timeline



Groundwater Investigation

Since 2014, Navy continues to

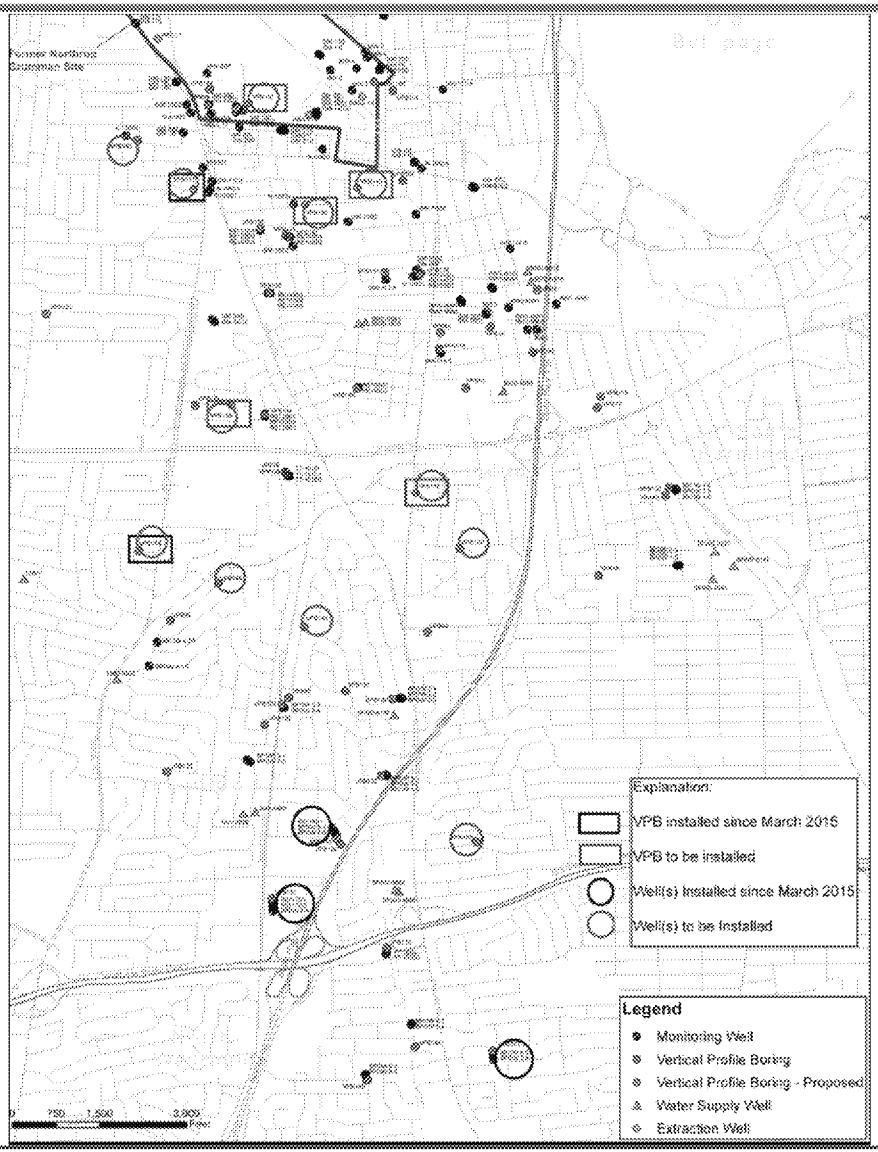
- delineating the plume (13 - VPBs and 3 -MWs)
- delineating the Hot Spot (7 - VPBs and 16 - MWs)

Navy has

- installing outpost monitoring wells to protect the water suppliers (7 - SFWD, 6 - MWD) and
- established trigger values

Navy is

- developing a preliminary model to located the Hot Spot Treatment Plant
- contracting with a water supply to conduct a pilot test to capture groundwater



REMEDIAL INVESTIGATION ADDENDUM SITE 1 – FORMER DRUM MARSHALLING AREA

NWIRP BETHPAGE
LONG ISLAND, NEW YORK

08/11/2015

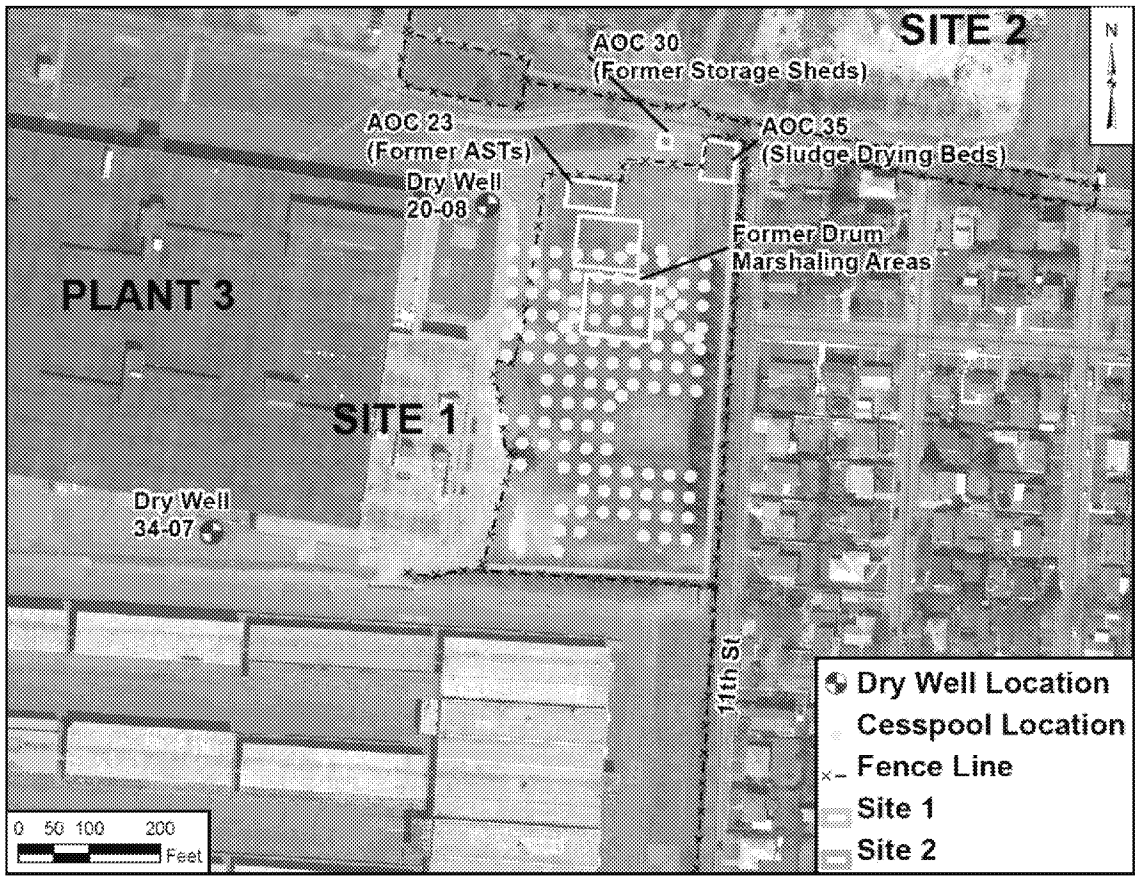
Outline

- Introduction
- History
- Remedial Investigation Addendum Results
- Path Forward

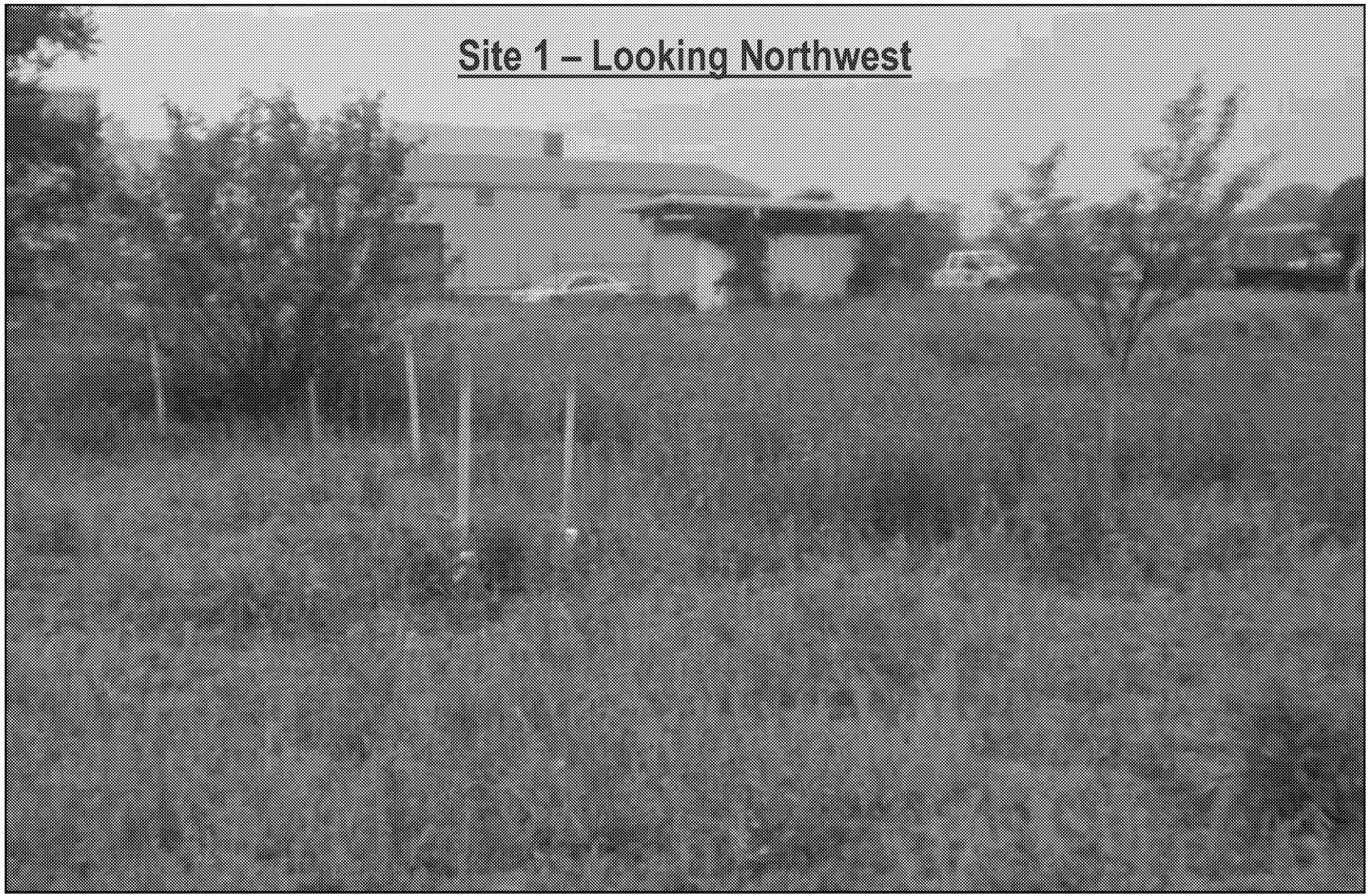
Site 1 History

- Two former drum marshalling pads
- 120 abandoned cesspools for sanitary waters from Plant 3

- Drywells – Area of Concern (AOC) 34-07 and AOC 20-08 for storm water
- AOC 23-Former Aboveground Storage Tanks (ASTs),
- AOC 35-Former Sludge Drying Beds, and
- AOC 30-Storage Sheds



Site 1 History



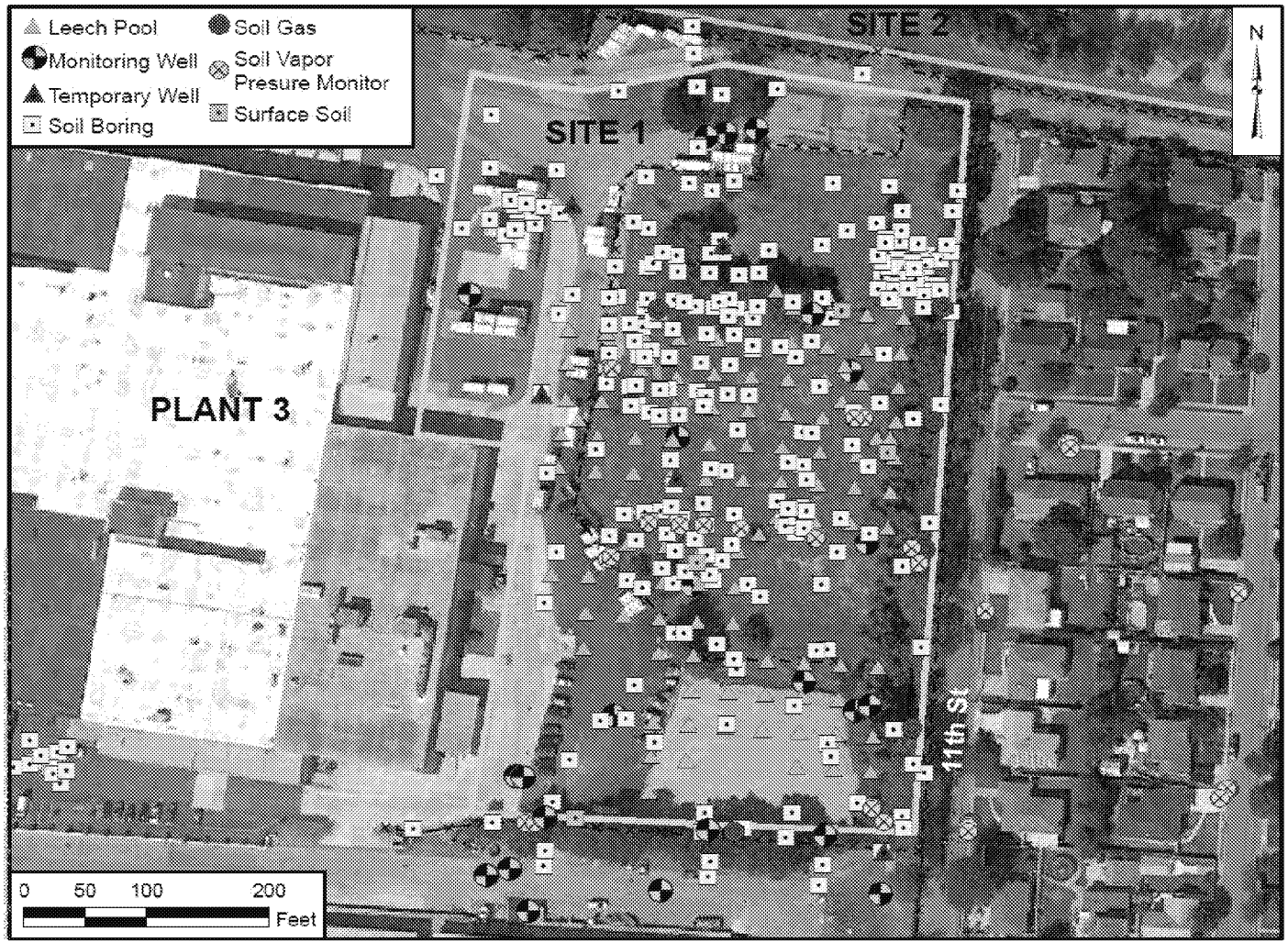
Site 1 History

Remedial Site Activities

- 1992 to1995- Initial investigations and Remedial Decision
- 1995 to 2008- Additional investigations conducted, volume increased from 1,400 cubic yards for to over 38,000 cubic yards
- 1997 to 2002- Source area cleanup volatile organic compound (VOC)-contaminated soil and shallow local groundwater
  - –Air Sparging/Soil Vapor Extraction Remediation System
  - –4,520 pounds of VOCs had been extracted and treated
  - –Achieved greater than 95% reduction of VOCs in groundwater
- 2009 to 2013- Supplemental soil and groundwater investigations
- 2010 to 2015- SVE Containment System operates to address vapor intrusion

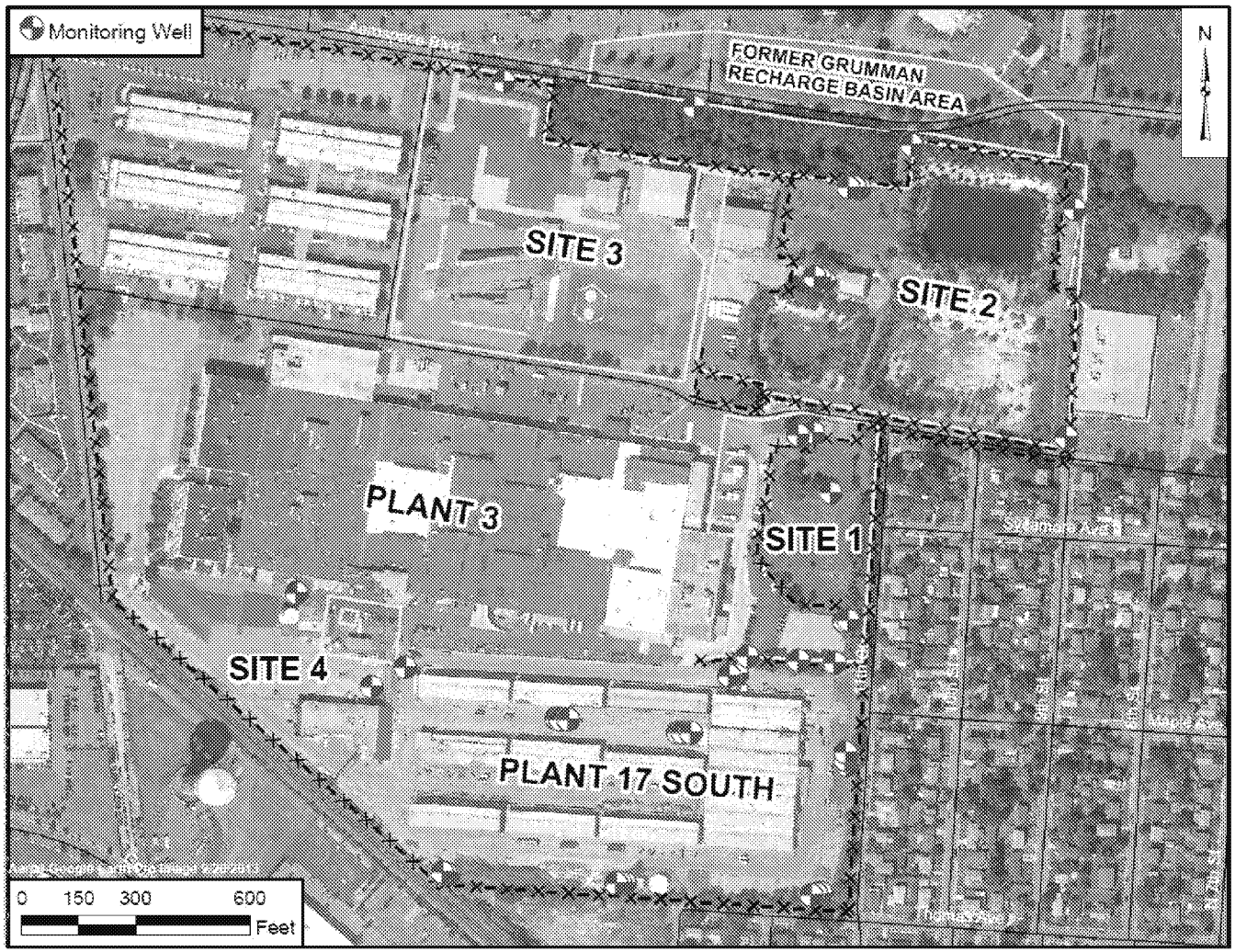
Site 1 Remedial Investigation Addendum

Field Activities (1991 to present)



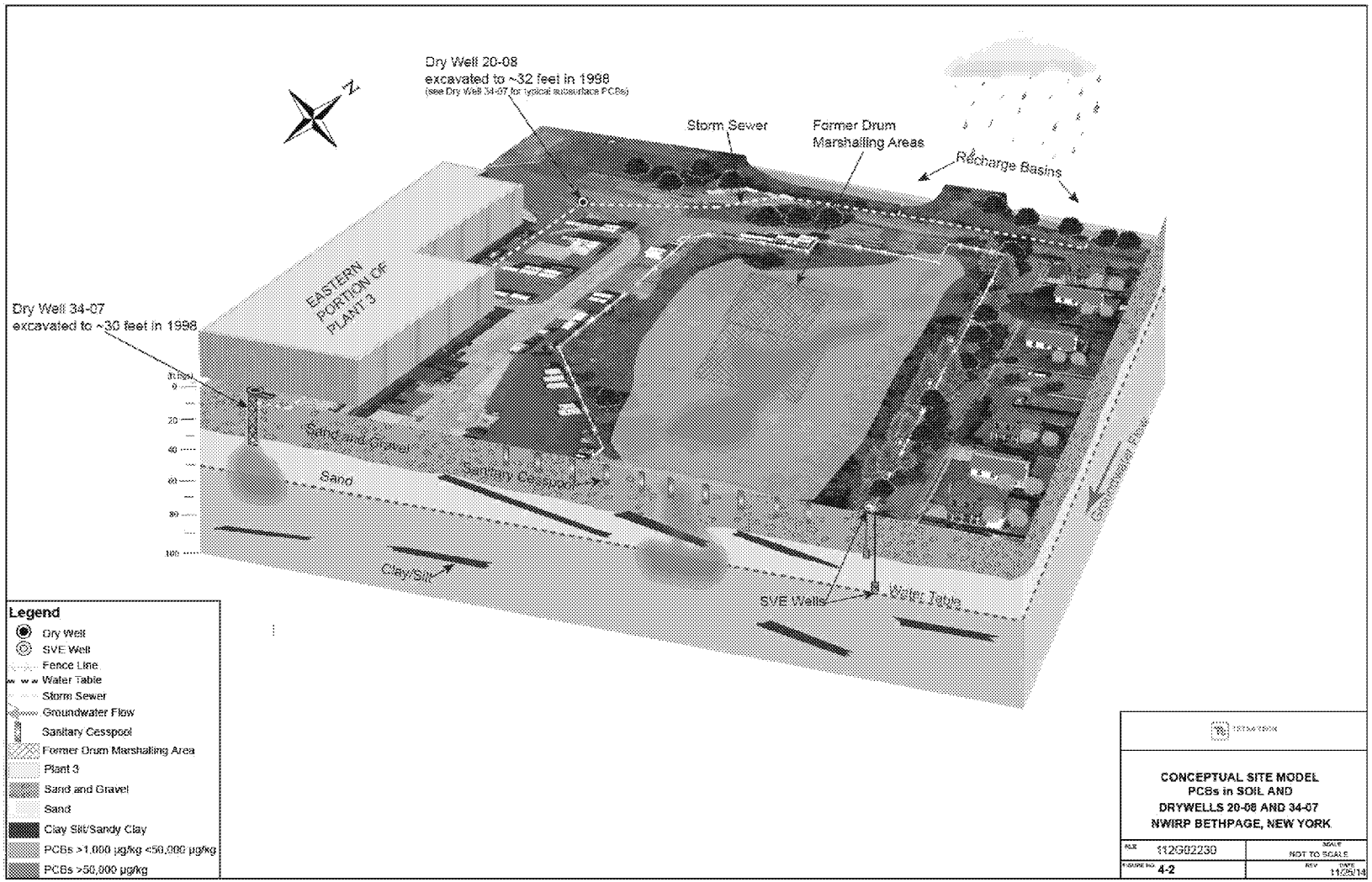
Site 1 Remedial Investigation Addendum

Groundwater Field Activities (2009 to 2013)



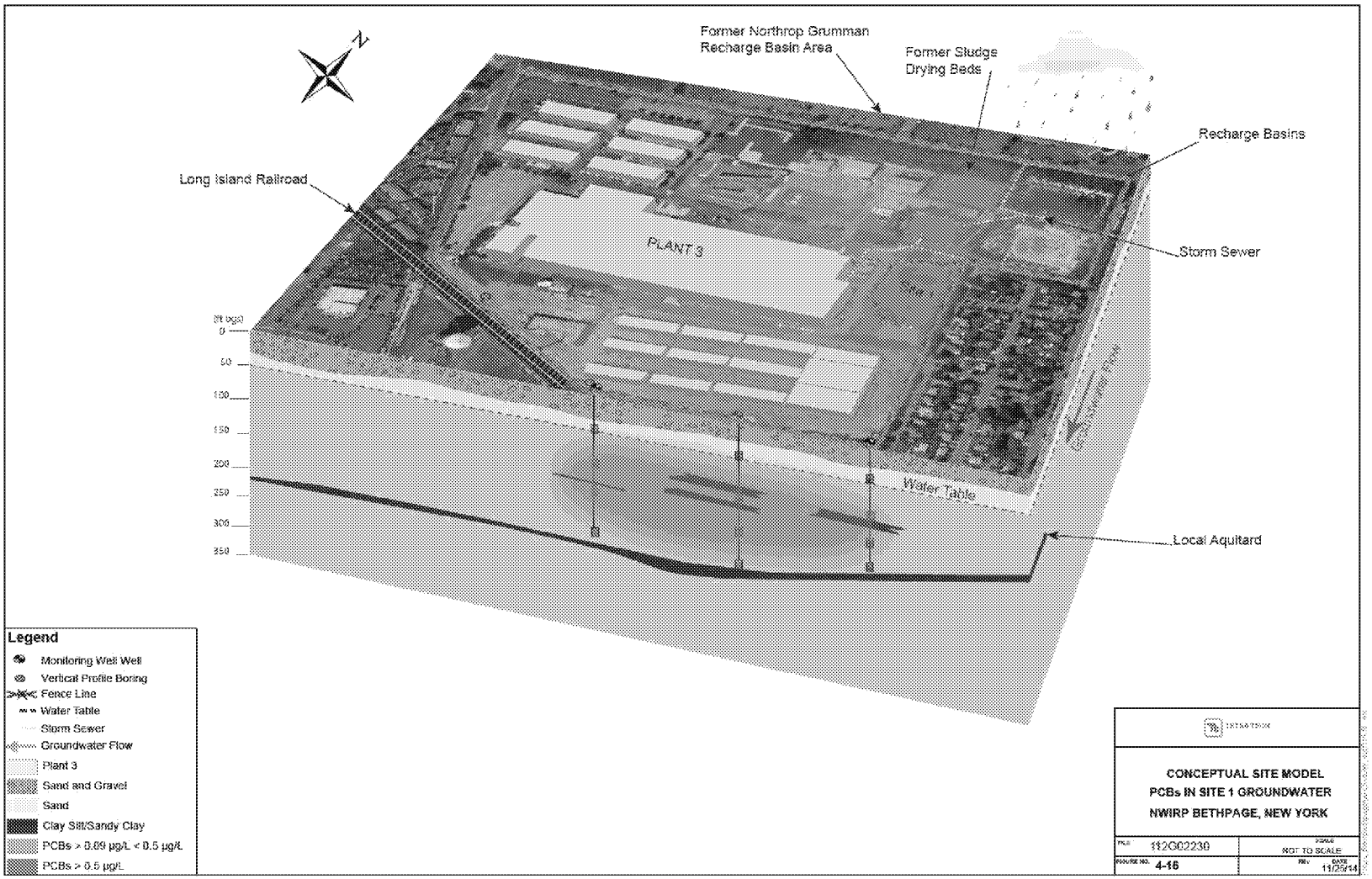
Site 1 Remedial Investigation Addendum

Results - PCBs in Soil



Site 1 Remedial Investigation Addendum

Results – PCBs in Groundwater



Site 1 Remedial Investigation Addendum

Remedial Site Results

- Media and chemicals to be addressed:
  - –Soil: Polychlorinated biphenyls (PCBs), chlordane, polynuclear aromatic hydrocarbons
  - –Groundwater: PCBs, arsenic, and hexavalent chromium
  - –Soil Vapor: Tetrachloroethene and trichloroethene

Path Forward

- 2015/2016 Feasibility Study
- 2016 Proposed Plan (45-day public comment period)
- 2016 OU1 ROD Amendment or new ROD
- 2017 Start of Remedy

OPERABLE UNIT 2 - OFFSITE GROUNDWATER INVESTIGATION

AUGUST 2015 RESTORATION ADVISORY BOARD

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

08/11/2015

PRESENTATION LAYOUT

1 - Program Objectives

2 - Local Groundwater Geology and Applicability to Bethpage Plume

3 - 2009 – 2014 Vertical Profile Borings and Wells

4 - Recent Work (Performed since last Restoration Advisory Board)

5 - Future Work

6 - Assessing Results and Recent Reports and Findings

OBJECTIVES

1. **Protection of public water supply wells –**
   All currently planned outpost wells are in place
2. **Assessment of RE108 Hotspot –**
   Installation of Monitoring Wells and Vertical Profile Borings to Delineate the Hotspot
3. **Address Hotspot –**
   Datalogger location for Bethpage Water District 6 Pilot Study for extraction and treatment

   Area to the southwest of Bethpage Water District 6 is being evaluated for separate extraction well

GROUNDWATER INVESTIGATION

Purpose: Delineate groundwater contamination in areas south of Naval Weapons Industrial Reserve Plant Bethpage

Program Components:

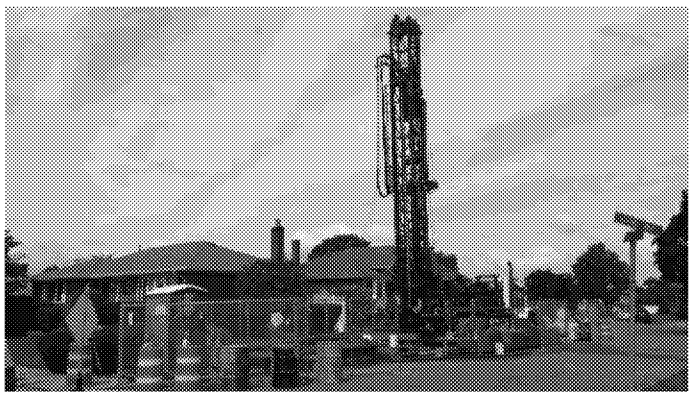
- **Vertical Profile Borings (VPB)** - used to quickly screen areas for the presence, depth, and concentration of contamination; drilling can take 4-8 weeks to complete
- **Permanent Monitoring Wells** - to confirm presence/absence of contamination and develop trends; drilling can take 2-6 weeks to complete
- **Data logging of water levels** - to support modeling and capture zone analysis for wells

VERTICAL PROFILE BORINGS (VPB)

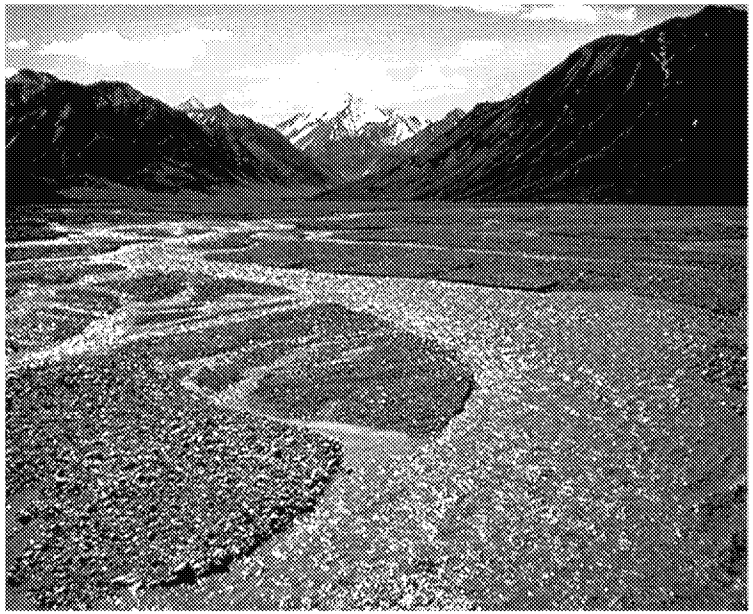
- **12-inch** diameter hole drilled into the ground
- Final boring is **860 to 1000 feet deep** (extending to the Raritan Clay Layer)
  - Drilling is stopped at selected depths and a device is lowered to sample the groundwater
  - **36 groundwater samples** are collected per boring and analyzed for Volatile Organic Compounds
- **4 to 8 weeks** to complete a boring/well

VPB AND WELL INSTALLATION PROCESS

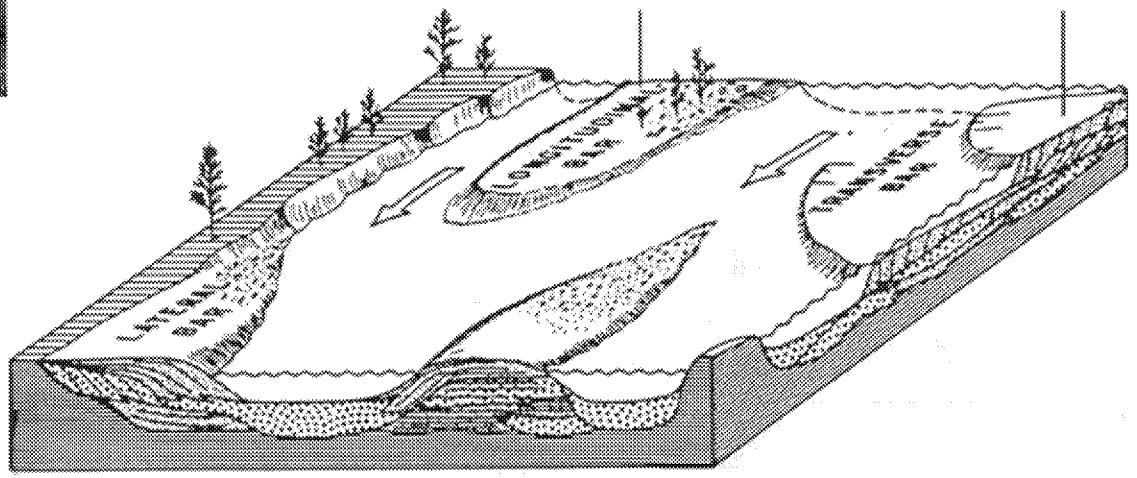
- **Process:**
  - –Ideal map location selected by Navy and State;
  - –Location is then ground-proofed by the Navy;
  - –Drilling rig requires minimum of 100 feet with no overhead obstructions;
  - –Generally on township right-of-ways;
  - –Considerations to minimize inconvenience to residents nearby:
    - Health and Safety Concerns
    - Ingress and egress
    - Noise
  - –Advanced notification to nearest residence



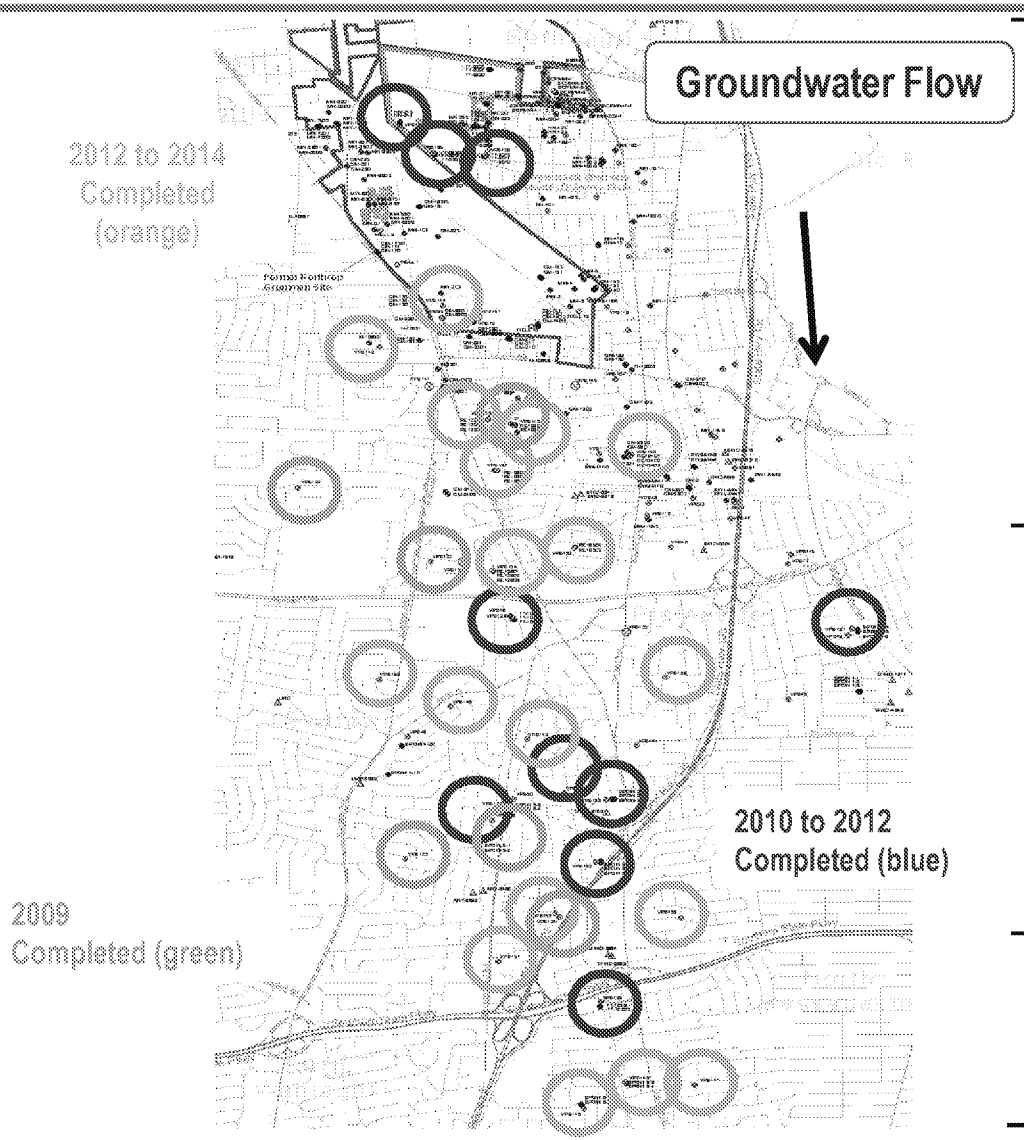
LOCAL GROUNDWATER GEOLOGY



MAGOTHY AQUIFER



2009 – 2014
VERTICAL PROFILE BORINGS AND WELLS



North of Hempstead Turnpike Area

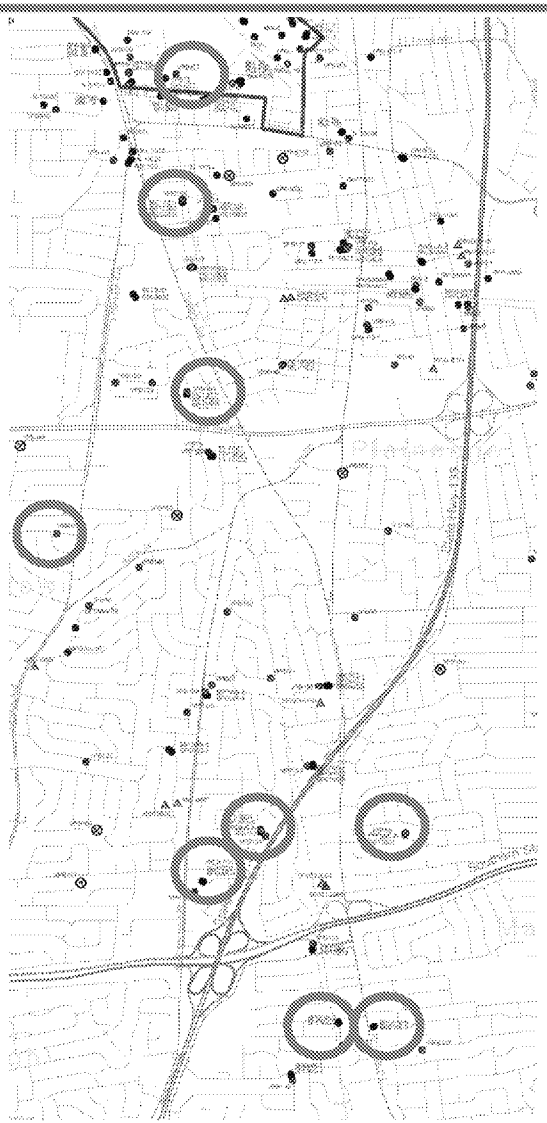
North of Southern State Parkway Area

South of Southern State Parkway Area

RECENT WORK
VERTICAL PROFILE BORINGS AND MONITORING WELLS

From November 2014 to present

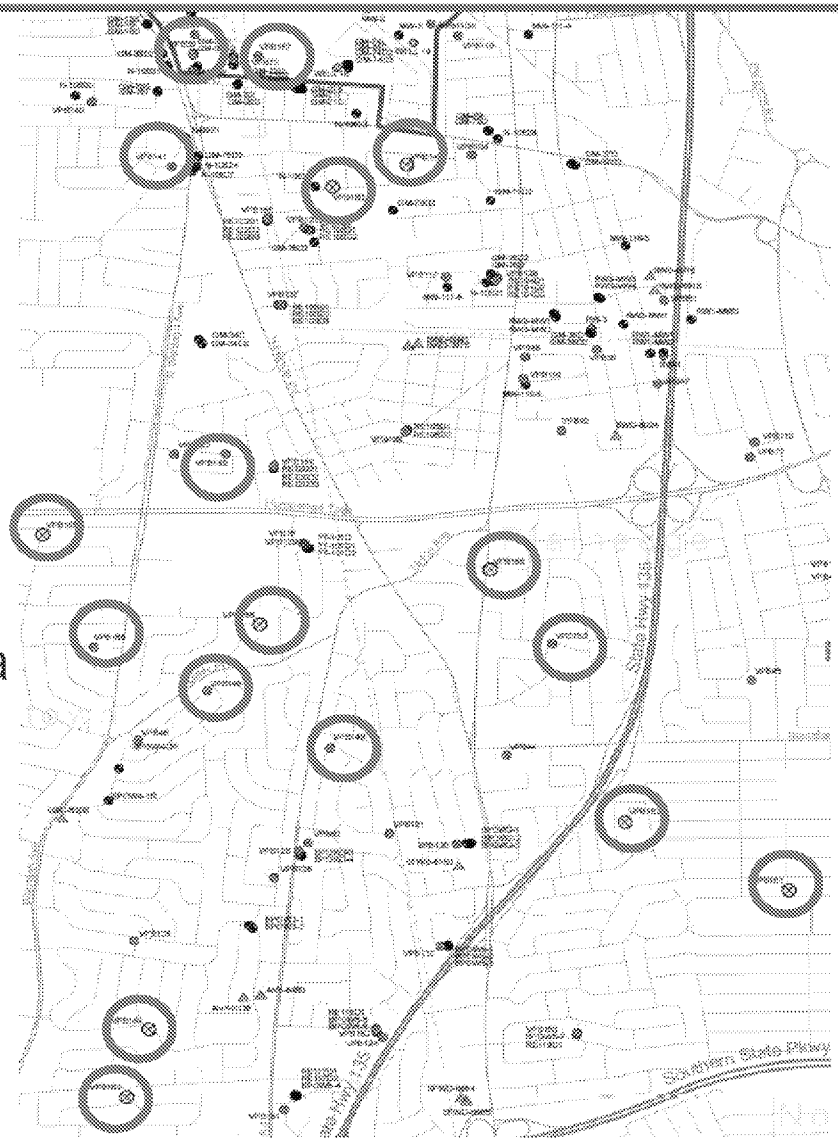
- –Operation of 3 drilling rigs
- –Installation of VPBs 152, 153, and 158 located North of Southern State Parkway Area
- –Installation of borings VPBs141, 157 and 159 North of Hempstead turnpike
- –Installation of 17 Monitoring Wells associated with VPBs 146,147, 151, 152, 153, 154, 156, and 157
- –Completion of 3 rounds of quarterly groundwater sampling



FUTURE WORK
VERTICAL PROFILE BORINGS AND MONITORING WELLS

Planned work through March 2017:

- Operation of 3 drilling rigs
- Installation of Vertical Profile Borings
  - 2 north of Hempstead Turnpike Area
  - 7 north of Southern State Parkway Area
- Installation of Monitoring Wells
  - 17 north of Southern State Parkway Area
  - 24 north of Hempstead Turnpike Area
- Continue quarterly groundwater sampling



ASSESSING GROUNDWATER RESULTS

Laboratory analysis is performed for a suite of volatile organic compounds, including all of those in the ROD.

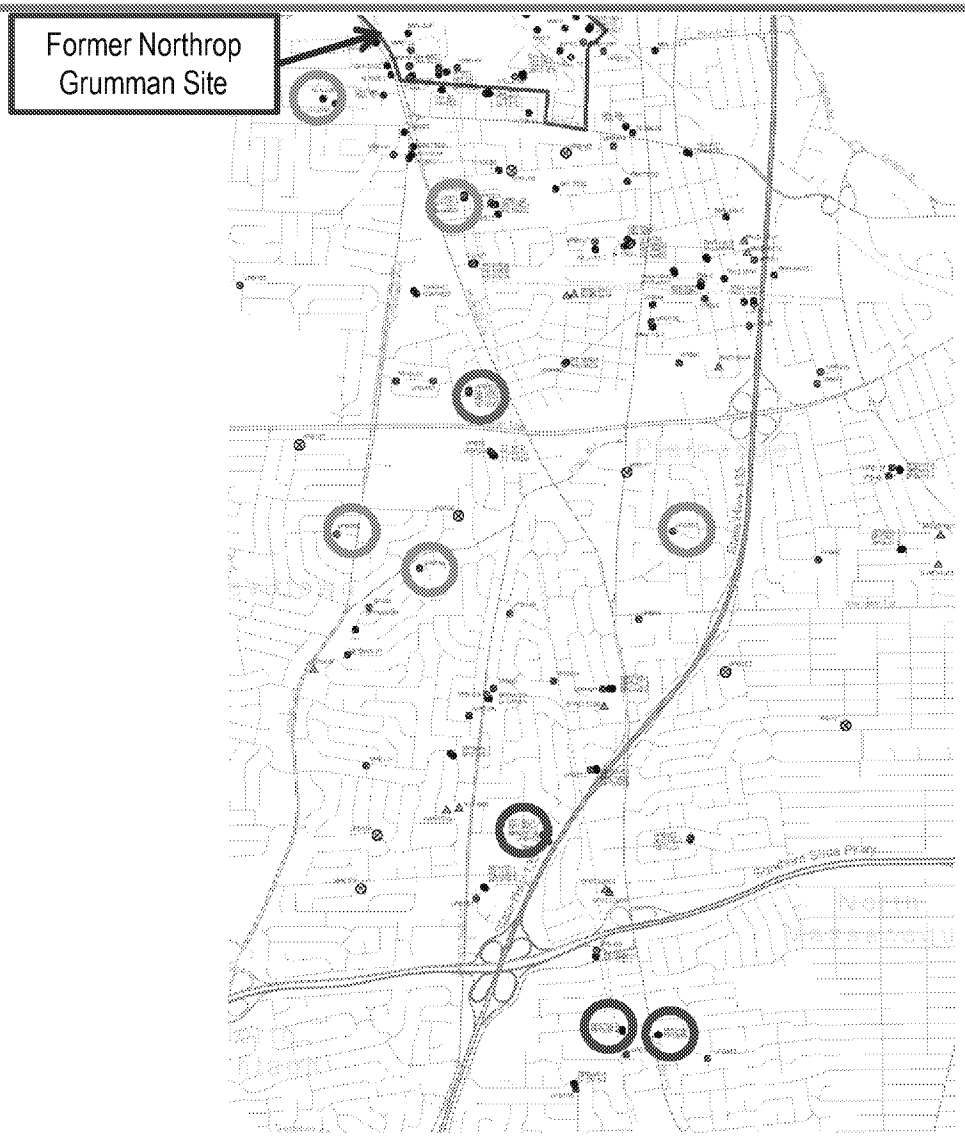
The primary organic contaminant being used to track the plume is trichloroethylene, because it has the highest concentrations of the volatile organic compounds analyzed

- Acceptable Maximum Contaminant Limit for trichloroethylene is a health-based limit established by Federal and State regulations
- The Maximum Contaminant Limit for trichloroethylene is 5 parts per billion

Hotspot Identification

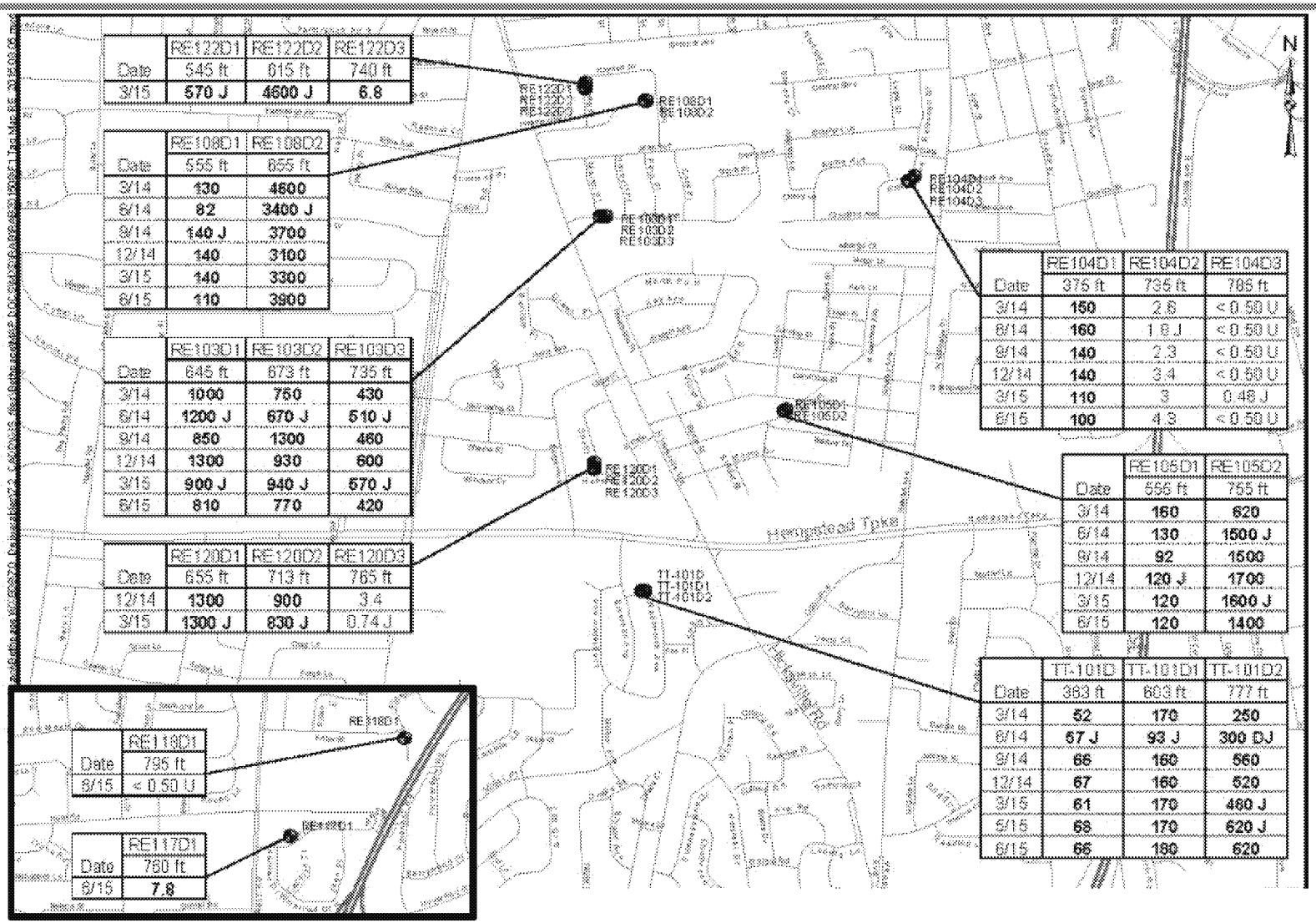
- Area with >1,000 parts per billion of total volatile organic compounds
- Defined in the Operable Unit 2 Offsite Groundwater 2003 Record of Decision

RECENT VPB RESULTS



- > 1,000 parts per billion trichloroethylene
- <1,000 parts per billion trichloroethylene
- Trichloroethylene not detected

RECENT QUARTERLY GROUNDWATER SAMPLING TRICHLOROETHYLENE RESULTS



Date	RE122D1 545 ft	RE122D2 615 ft	RE122D3 740 ft
3/15	570 J	4600 J	6.8

Date	RE108D1 555 ft	RE108D2 855 ft
3/14	130	4600
6/14	82	3400 J
9/14	140 J	3700
12/14	140	3100
3/15	140	3300
6/15	110	3900

Date	RE103D1 645 ft	RE103D2 673 ft	RE103D3 735 ft
3/14	1000	750	430
6/14	1200 J	670 J	510 J
9/14	850	1300	460
12/14	1300	930	600
3/15	900 J	940 J	570 J
6/15	810	770	420

Date	RE120D1 655 ft	RE120D2 713 ft	RE120D3 765 ft
12/14	1300	900	3.4
3/15	1300 J	830 J	0.74 J

Date	RE104D1 375 ft	RE104D2 735 ft	RE104D3 785 ft
3/14	150	2.6	< 0.50 U
6/14	160	1.8 J	< 0.50 U
9/14	140	2.3	< 0.50 U
12/14	140	3.4	< 0.50 U
3/15	110	3	0.48 J
6/15	100	4.3	< 0.50 U

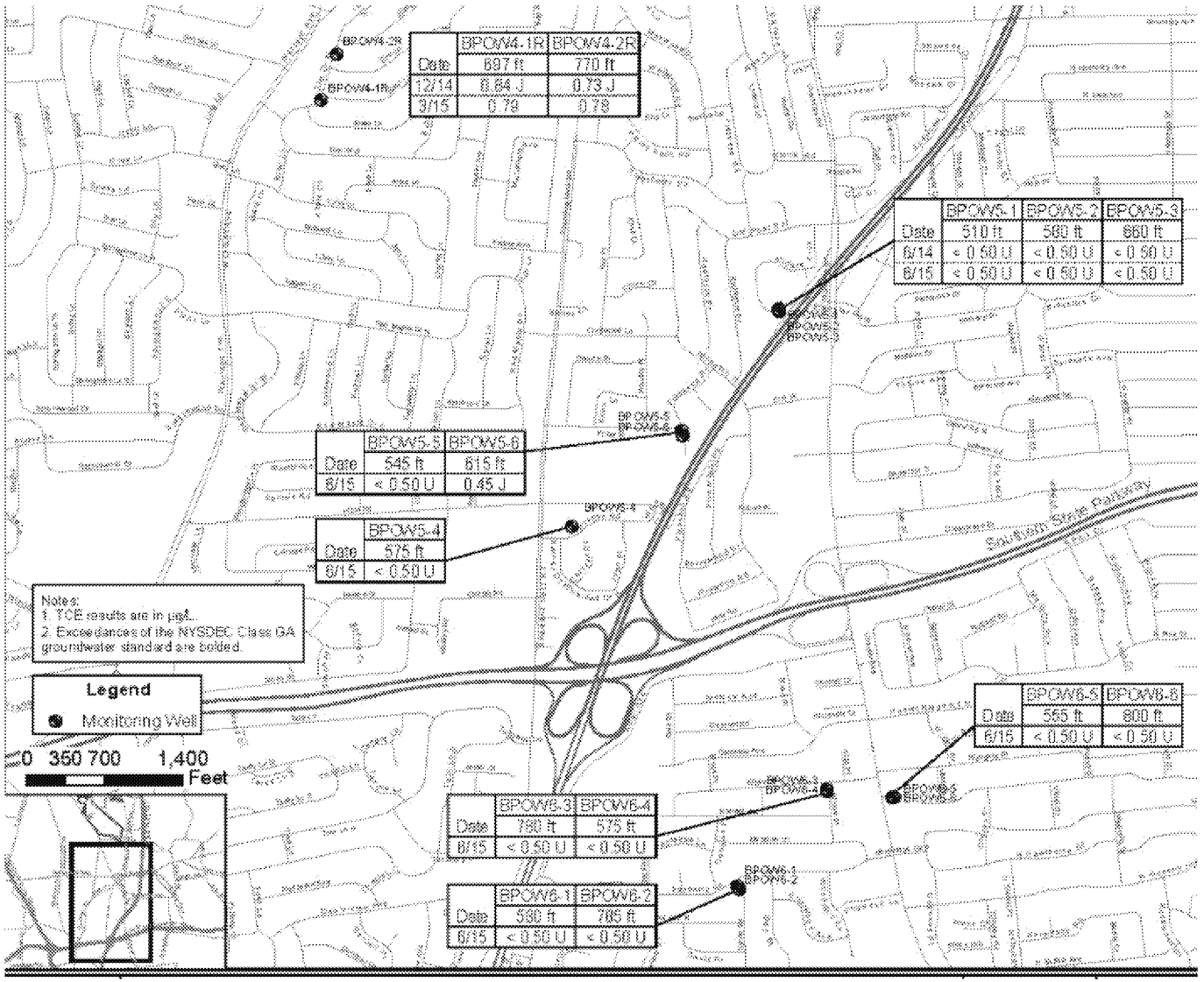
Date	RE105D1 556 ft	RE105D2 765 ft
3/14	160	620
6/14	130	1500 J
9/14	92	1500
12/14	120 J	1700
3/15	120	1600 J
6/15	120	1400

Date	TT-101D 363 ft	TT-101D1 603 ft	TT-101D2 777 ft
3/14	52	170	250
6/14	57 J	93 J	300 DJ
9/14	66	160	560
12/14	67	160	520
3/15	61	170	460 J
5/15	68	170	620 J
6/15	66	180	620

Date	RE118D1 795 ft
6/15	< 0.50 U

Date	RE117D1 760 ft
6/15	7.8

RECENT QUARTERLY GROUNDWATER SAMPLING 2015 TRICHLOROETHYLENE RESULTS



GROUNDWATER SAMPLING RECENT RESULTS

- **Conclusions:**

Objective 1 -Outpost wells recently installed

– BPOW 6-4, BPOW 6-5, BPOW 6-6, BPOW 5-4, BPOW 5-5, BPOW 5-6, and BPOW 5-7

Objective 2 -Assessment of hotspots

– New hotspot (RE108) has been identified by latest phase of Navy drilling program

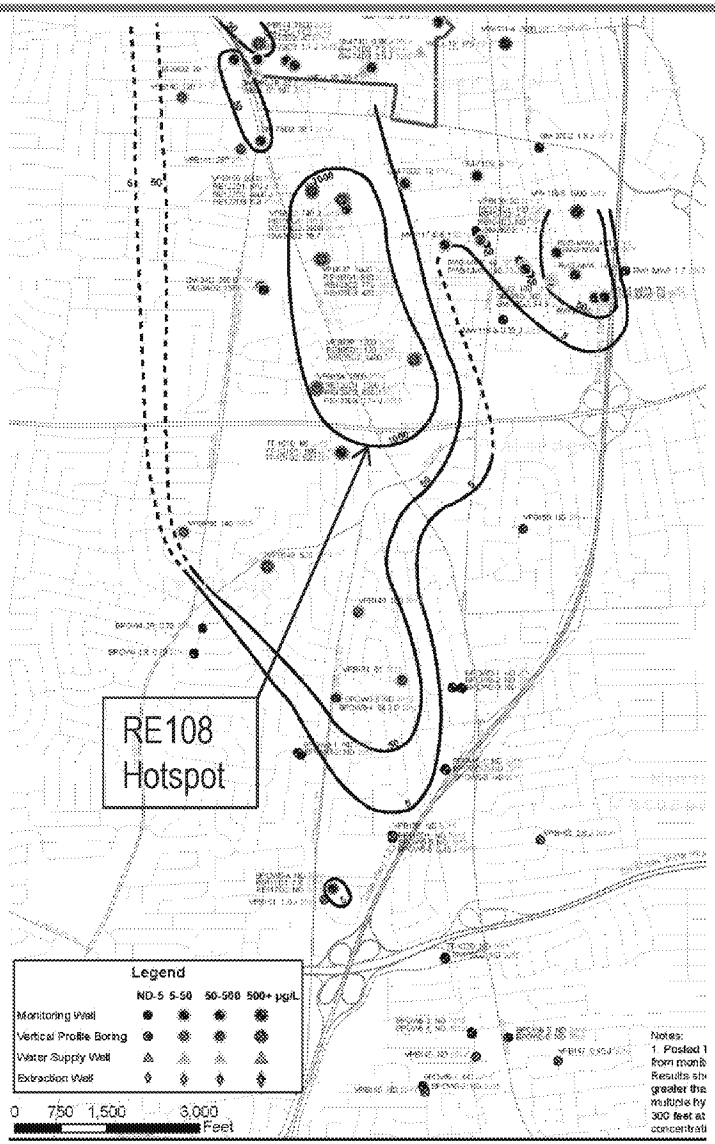
  - trichloroethylene found above 1,000 parts per billion in the North of Hempstead Turnpike Area at depths greater than 600 feet
  - Additional drilling is planned to the north, south and west

– GM-38 Hotspot previously identified to the east has been undergoing treatment since 2009

Objective 3 – Address Hot Spot

– Treatment options are being evaluated to mitigate potential impacts to public water supply wells; pilot study dataloggers installed to evaluate capture zone

– Groundwater monitoring will continue so concentration trends, if any, over time can be assessed



OU2 – OFFSITE GROUNDWATER

QUESTIONS?